Operating parameters

WINDY BOY

Technical Description

WB_Par-TEN093910 | Version 1.0

EN

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1 Information about this Manual

1.1 Scope of Validity

In this document you will find the description and meaning of the operating parameters of the following wind energy inverters.

- WB 1100LV
- WB 1100
- WB 1200
- WB 1700
- WB 2500
- WB 3000
- WB 3300
- WB 3800
- WB 5000A
- WB 6000A

1.2 Target Group

This document is intended for installers and operators of the inverter. Some of the parameters described in this document may only be changed by qualified electronics specialists.

1.3 Additional Information

You will find information on assembly, installation, commissioning, and maintenance of the inverter as well as device-specific technical information in the installation guide of the respective inverter. You will find information on operating the inverter in the according user manual.

1.4 Symbols Used

The following types of safety instructions and general information are used in this document:

DANGER!

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

Information

Information provides tips that are valuable for the optimal installation and operation of your product.

2 Safety Instructions

The different operating parameters control the functionality of the inverter. They can only be viewed and changed using a communication device or communication software.

Some parameters can only be viewed by an installer (parameters highlighted in gray). The so-called "installer password" is required for this. Only the installer can change parameters.

Parameters with an asterisk (*) are safety-related grid monitoring parameters (SMA Grid Guard). To be able to change the SMA Grid Guard parameters, the installer requires a personal "SMA Grid Guard password" (Inst.-Code). Call the SMA Serviceline to obtain your personal SMA Grid Guard password.

DANGER!

Danger to life through changing the inverter's internal safety specifications.

Unauthorized changes to the SMA Grid Guard parameters cause the operating license to become void.

- SMA Grid Guard parameters may only be changed with the express authorization of the grid operator.

Default Settings of the Inverters

The information on the type plate indicates the default settings of the inverter.

3 Explanation of the Operating Parameters

Name	Description
ACVtgRPro	Voltage increase protection (only relevant for Germany). In Germany, inverters can feed into the public grid with up to 260 V AC. However, the DIN VDE 10-0126-1 standard stipulates that the 10-minute AC voltage average may not exceed 253 V. If the 10-minute average exceeds the threshold value of 253 V, the inverter will disconnect from the grid. As soon as the 10-minute average decreases back to less than 253 V, the inverter will continue to feed power into the grid. If voltage increase protection is not required in the relevant grid area (outside Germany), it can be deactivated by presetting the LDVtgC parameter. In this case, only the quick disconnection will be active, which can be configured through the Uac-Max parameter.
AID-Esk-Alpha *	Amplification factor of the the escalating AntiIsland process
AntiIsland-Ampl *	Amplification of the AntiIsland process (alternative anti-islanding process which is deactivated for Germany).
AntiIsland-Freq *	Repetition rate of the AntiIsland process (alternative anti-islanding process which is deactivated for Germany).
Operating Mode	Turbine operating mode for wind energy inverters This operating mode is only for operating wind energy systems. If you want to change the operating mode, consult the SMA Serviceline first.
Control	Configuring the current control. Possible settings: Auto: The inverter automatically chooses the right type of current control. Grid: The inverter regulates on the grid side. Bridge: The inverter regulates on the bridge side. This setting can help in case of difficult grid conditions. Discuss any changes to this parameter with the SMA Serviceline.
Default *	Defines the country data set for adjusting country-specific information. You will find the procedure for changing country settings in chapter 4.2 "Country-Specific Grid Settings" (page 16).
dFac-Max *	Maximum grid frequency change before the grid monitoring system disconnects the device from the grid.
dZac-Max *	Maximum grid impedance change before the grid monitoring system disconnects the device from the grid.
E_Total	Total energy yield of the inverter. Changing this may be necessary if you replace the inverter and want to use data from the old device.

Name	Description
Fac-delta- * Fac-delta+ * Fac-delta-Fast * Fac-delta+Fast *	Maximum permissible frequency drift (frequency surge protection and frequency drop protection); it may be above (Fac-delta+, Fac-delta+Fast) or below (Fac-delta-, Fac-delta-Fast) the grid frequency of 50 or 60 Hz before the grid monitoring system disconnects the device from the grid.
Fac-Limit delta Fac-Start delta	For setting the frequency-dependent output derating in the "Off Grid" operating mode. More information on this subject can be found in the Sunny Island manual.
Fac-Min-Fast-Tm * Fac-Max-Fast-Tm * Fac-Min-Tm * Fac-Max-Tm *	Disconnection time for frequency surge protection (Fac-delta+, Fac-delta+Fast) and frequency drop protection (Fac-delta-, Fac-delta-Fast).
Fac-Pderating	Active power limiting depending on frequency.
Fac-Tavg	Averaging time of grid frequency measurement
Fan test	By setting the "Fan-Test" parameter to "1", the functionality of the fan can be tested (only for fan devices).
h_Total	Total operating time of the inverter. Changing this may be necessary if you replace the inverter and want to use data from the old device.
Hardware-BFS	Hardware version of the operation control unit (BFS).
testcurrent Zac	Setting the impulse for impedance monitoring (0 = off). This parameter can only be changed when the inverter is deactivated (disconnection on the AC side), or if it is in "Stop" mode.
Inst.-Code	Through this parameter you can enter the SMA Grid Guard password.
KP-Wind-Reg	This value defines the proportional factor of the power control It determines the factor of the direct response to control deviation (control deviation = nominal power - actual power). kp * control deviation = corrective power value Exceedingly high values lead to vibrations and instabilities in the system.
KI-Wind-Reg	This value defines the integral factor of the power control. It determines the factor of the time-dependent response to control deviation. ki * time integral of the control deviation = corrective power value Exceedingly high values lead to vibrations and instabilities in the system.

Name	Description
LDVtgC	Compensation for the voltage drop in the cabling. This parameter takes into account the voltage drop between the inverter and the grid connection point. The 10-minute average voltage at the inverter connection must not exceed the sum of ACVtgRPro plus LDVtgC. The LDVtgC parameter is preset to 0 V for Germany. In grid regions where an additional voltage increase protection (see ACVtgRPro parameter) is not required, the LDVtgC parameter is preset to 50 V. Therefore, the voltage increase protection is deactivated for these grid areas (253 V + 50 V = 303 V) and only the quick disconnection via the Vac-Max parameter is active.
Grid connection	This operating parameter lets you save in the inverter which phase it is connected to. This makes it easier to manage which inverter is installed at which phase in system overview.
P-Wind-Ramp	This parameter lets you configure the controlled startup of the wind turbine system. Only in the case that the inverter is connected to the grid will the wind turbine system not be charged rapidly, but rather with a configurable ramp. After the connection process, this parameter will no longer be active.
Plimit	Effective power limitation of the inverter
Pmax	This parameter defines the maximum AC output of the inverter. The inverter will feed no more than the maximum value defined here into the grid. Should the wind turbine system still produce more power than "Pmax", this surplus power must be discharged accordingly. Otherwise, there is a risk that the inverter will be damaged by overvoltage.

Name	Description
PowerBalancer *	Operating mode of the SMA Power Balancer for avoiding unbalanced loads in 3-phase systems. The SMA Power Balancer has four operating modes: Off: the SMA Power Balancer is deactivated. In case of a device disturbance or a grid voltage disturbance of an inverter, only this inverter will be disconnected from the grid, while the other two devices will continue to run without reducing their output. PowerGuard: operating mode in which no distinction is made between a device disturbance and a grid voltage disturbance. The affected device will disconnect from the grid, while the other two inverters limit their output to a 10-minute average of 5 kVA. PhaseGuard: operating mode in which a distinction is made between a device disturbance and a grid voltage disturbance. In case of a device disturbance at the first Sunny Mini Central, the other two inverters will continue to operate without reducing their output. In case of a grid voltage disturbance, all devices will immediately disconnect from the grid. FaultGuard: operating mode in which a distinction is made between a device disturbance and a grid voltage disturbance. In case of a device disturbance, the failure message will be sent to the other two devices with a time delay of 5 minutes. After the 5 minutes have passed, the other two devices will disconnect from the grid as well. In case of a grid voltage disturbance, all devices will immediately disconnect from the grid.
Ripple-Ctl-Frq Ripple-Ctl-Lev Ripple-Ctl-Rcvr	The Ripple-Ctl-Frq, Ripple-Ctl-Lev, and Ripple-Ctl-Rcvr parameters are intended for handling ripple control signals from the SMA inverters. These parameters are not available for all inverters. These parameters may only be changed after prior consultation with SMA Solar Technology.
SMA-Grid-Guard	This parameter shows the expansion level of the Grid Guard implementation in the device.
SMA-SN	Inverter serial number
Software-BFR	Firmware version of the operation control unit (BFR)
Software-SRR	Firmware version of the current control unit (SRR)
Memory Function	Default Param.: Resets all non-country-dependent parameters to the factory settings. Reset op.data: resets all operating data. Reset errors: resets a permanent fault.
T-Max-Fan	Temperature for the maximum fan speed.

Name	Description
T-Start *	This value defines the time the inverter will wait before connecting to the grid. If the DC input voltage for the time set here is above "Vpv-Start" and all tests have been completed successfully, the inverter will connect to the grid. This value is regulated by country-specific standards and may only be changed after consulting the SMA Serviceline.
T-Start-Fan T-Start-Fan-In T-Start-Fan-Mod	At this temperature the fan will start to run at minimum speed.
T-Stop	This value defines the time for which the inverter will remain connected to the grid despite a low input voltage. If the DC input voltage falls below the minimum DC voltage of the inverter, the inverter will remain connected to the grid for the duration of "T-Stop" but will not feed in any power. During this time, it will draw its power for internal consumption from the AC grid. Should the DC input voltage exceed the minimum DC input voltage during this time, the inverter will feed the power directly into the grid. No grid synchronization is required.
T-Stop-Fan T-Stop-Fan-In T-Stop-Fan-Mod	If, after a temperature increase, the inverter cools down to below this threshold value, the fan will switch off again.
Vac-Min * Vac-Max * Vac-Min-Fast * Vac-Max-Fast *	Lower (Vac-Min) and upper (Vac-Max) limits of the permissible AC voltage before the grid monitoring system disconnects the device from the grid. Additional monitoring of AC voltage (deactivated for Germany).
Vac-Min-Tm * Vac-Max-Tm * Vac-Min-Fast-Tm * Vac-Max-Fast-Tm *	Disconnection time for the voltage increase protection (Vac-Max-Tm, Vac-Max-Fast-Tm) and the voltage drop protection (Vac-Min-Tm, Vac-Min-Fast-Tm).
Vac-Tavg	Averaging time for measuring grid frequency
UdcWindStart	This parameter defines the starting point of the output characteristic curve. When the DC input voltage reaches this value after grid synchronization, the inverter using the output characteristic curve, starts with the load of the wind turbine system and feeds into the grid.
UdcWindStop	This parameter is only relevant for the Windy Boy 1100LV. If the value falls below UdcWindStop, the inverter decreases its internal (DC) consumption by deactivating the power semiconductor.

Name	Description
Vpv-Start	This parameter defines the grid connection voltage. As soon as the DC input voltage of the inverter reaches the voltage specified here, the grid monitoring system of the inverter is activated. In this case, the inverter will perform various self-tests, measurement processes, and the grid synchronization. When the tests have been successfully completed and the DC input voltage for the time "T-Start" rises above "Vpv-Start," the inverter will connect to the grid.
Vconst-Setpoint	Target DC voltage for constant operating voltage. This parameter is only important if the "Operating Mode" parameter is set to V-konst.
Wind_a_0 Wind_a_1 Wind_a_2 Wind_a_3	The following formula gives the factors for the voltage-dependent power calculation: $P(U) = a_0 + a_1 * U + a_2 * U^2 + a_3 * U^3$

4 Parameter Settings

4.1 Default Settings for Wind Parameters

You can change all wind parameters, except for "Operating Mode", for the following inverters and beginning with the following firmware versions with the Windy Boy Setup Tool (www.SMA.de/en).

Inverter	From firmware version
WB 1100LV	1.27
WB 1100	2.64
WB 1200	2.99
WB 1700	2.64
WB 2500	2.87
WB 3000	2.87
WB 3300	Wind parameters cannot be changed with the Windy Boy Setup Tool at the moment.
WB 3800	Wind parameters cannot be changed with the Windy Boy Setup Tool at the moment.
WB 5000A	1.33
WB 6000A	1.33

4.1.1 Windy Boy 1100LV

Name	Unit	Default settings
Operating Mode	–	Turbine
Pmax	W	1100
Vpv-Start	V	25
UdcWindStart	V	25
UdcWindStop	V	24.9
KP-Wind-Reg	–	0.117
KI-Wind-Reg	–	0.005
P-Wind-Ramp	W/sec	183
T-Stop	sec	2
Wind_a_0	–	–1897.6
Wind_a_1	–	182.87
Wind_a_2	e-3	–5934
Wind_a_3	e-6	66410

4.1.2 Windy Boy 1100 / 1200 / 1700

Name	Unit	Default settings		
		WB 1100	WB 1200	WB 1700
Operating Mode	–	Mpp-Operation	Mpp-Operation	Mpp-Operation
Pmax	W	1100	1200	1700
Vpv-Start	V	180	120	180
UdcWindStart	V	150	150	150
KP-Wind-Reg	–	0.117	0.117	0.117
KI-Wind-Reg	–	0.005	0.005	0.005
P-Wind-Ramp	W/sec	330	330	330
T-Stop	sec	2	2	2
Wind_a_0	–	–83	–83	–314
Wind_a_1	–	2.92	2.92	8.76
Wind_a_2	e-3	–30.62	–30.62	–73
Wind_a_3	e-6	99.22	99.22	197.84

4.1.3 Windy Boy 2500 / 3000

Name	Unit	Default settings	
		WB 2500	WB 3000
Operating Mode	–	Mpp-Operation	Mpp-Operation
Pmax	W	2500	3000
Vpv-Start	V	300	330
UdcWindStart	V	250	270
KP-Wind-Reg	–	0.02	0.02
KI-Wind-Reg	–	0.005	0.005
P-Wind-Ramp	W/sec	500	500
T-Stop	sec	2	2
Wind_a_0	–	–1538	–3923
Wind_a_1	–	17.07	38.36
Wind_a_2	e-3	–64.43	–128
Wind_a_3	e-6	85.06	147.8

4.1.4 Windy Boy 3300 / 3800

Name	Unit	Default settings	
		WB 3300	WB 3800
Operating Mode	–	Mpp-Operation	Mpp-Operation
Pmax	W	3600	3800
Vpv-Start	V	250	250
UdcWindStart	V	200	200
UdcWindMid	V	315	315
P-Wind-Mid	W	780	780
UdcWindMax	V	450	450
KP-Wind-Reg	–	0.117	0.117
KI-Wind-Reg	–	0.005	0.005
P-Wind-Ramp	W/sec	650	650
T-Stop	sec	2	2

4.1.5 Windy Boy 5000A / 6000A

Name	Unit	Default settings	
		WB 5000A	WB 6000A
Operating Mode	–	Mpp-Operation	Mpp-Operation
Pmax	W	5500	6000
Vpv-Start	V	300	300
UdcWindStart	V	150	150
KP-Wind-Reg	–	0.02	0.02
KI-Wind-Reg	–	0.005	0.005
P-Wind-Ramp	W/sec	1000	1000
T-Stop	s	2	2
Wind_a_0	–	–1993	–8197
Wind_a_1	–	22.687	77.08
Wind_a_2	e-3	–92.3	–247.8
Wind_a_3	e-6	135.3	281.2

4.2 Country-Specific Grid Settings

Using the "Default" parameter you can configure the country of installation and/or the grid connection standard valid for the country through a communication device or a PC with appropriate software. This is necessary if the inverter was originally ordered for another country and was preset accordingly by SMA Solar Technology.

Should your country, or the standards applicable for your country, not be listed in the following overview, contact the SMA Serviceline.

Parameters	Setting	Description
Default *	GER/MSD	Country-specific parameter settings for Germany in accordance with the DIN VDE 0126 (4.99) standard
	GER/VDE0126-1-1	Country-specific parameter settings for Germany and France in accordance with the DIN VDE 0126-1-1 standard
	SP/RD1663	Country-specific parameter settings for Spain
	SP/RD1663/661	Country-specific parameter settings for Spain
	AUS/AS4777	Country-specific parameter settings for Australia
	IT/DK5940 Ed.2	Country-specific parameter settings for Italy
	GB	Country-specific parameter settings for Great Britain
	GB/G83	Country-specific parameter settings for Great Britain
	KOR/KEPCO Guide	Country-specific parameter settings for Korea
	EN 50438	Country-specific parameter settings for Portugal
	EN 50438-CZ	Country-specific parameter settings for the Czech Republic
	CZ/PPDS	Country-specific parameter settings for the Czech Republic
	GR/PPC	Country-specific parameter settings for Greece
	TH/PEA	Country-specific parameter settings for Thailand (City)
	TH/MEA	Country-specific parameter settings for Thailand (Country)
	BE/C10/11	Country-specific parameter settings for Belgium
Default *	Other	Parameter settings for countries for which there are no pre-defined settings can be configured here.
	trimmed	If country specific-parameters have been changed, "trimmed" will be displayed in the display.
	OFF_Grid	Setting for inverters which are operated in a stand-alone grid. You can find further information in the Sunny Island manual.

4.2.1 Further Country-Specific Parameters

Parameter	Unit	Description
ACVtgRPro	V	You will find a detailed description of this parameter in section 3 "Explanation of the Operating Parameters" (page 7).
AID-Esk-Alpha	deg/%	
AntiIsland-Ampl	deg	
AntiIsland-Freq	mHz	
AntiIsland-Lim	Hz	
DC-Offset-Max	mA	
dFac-Max	Hz/s	
dZac-Max	mOhm	
Fac-delta-	Hz	
Fac-delta+	Hz	
Fac-delta-Fast	Hz	
Fac-delta+Fast	Hz	
Fac-Max-Fast-Tm	s	
Fac-Max-Tm	s	
Fac-Min-Fast-Tm	s	
Fac-Min-Tm	s	
testcurrent Zac	mA	
LDVtgC	V	
impedance test	–	
T-Start	s	
Vac-Max	V	
Vac-Max-Fast	V	
Vac-Max-Fast-Tm	s	
Vac-Max-Tm	s	
Vac-Min	V	
Vac-Min-Fast	V	
Vac-Min-Fast-Tm	s	
Vac-Min-Tm	s	

5 Contact

If you have technical problems concerning our products, contact the SMA Serviceline. We require the following information in order to provide you with the necessary assistance:

- Inverter device type
- Inverter serial number
- Type of connected wind turbine system
- Technical information of the connected wind energy system
- Blink code or display of the inverter
- Type of communication, if applicable

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